# LIVERMORE LAB REPORT

**A weekly compendium of media reports on science and technology achievements at Lawrence Livermore National Laboratory, July 14-18. Though the Laboratory reviews items for overall accuracy, the reporting organizations are responsible for the content in the links below.**

npr UNDER PRESSURE

**The interior of the target chamber at the National Ignition Facility, which was recently used to study the interior state of giant planets. Image by Damien Jemison/LLNL.**

The world's largest laser has been used tore-create the conditions deep inside planets such as Jupiter and Uranus. The research will help scientists better understand how material behaves at the great pressures that prevail deep inside giant planets.

Lawrence Livermore Physicist Ray Smith and his colleagues achieved the feat at the National Ignition Facility. NIF has a practical purpose, however: to trigger nuclear fusion, the same type of reaction that powers the sun. Scientists also use it for basic research, such as investigating how various materials respond when compressed -- data relevant to the interiors of planets.

Smith's team fired 176 lasers at a small gold cylinder measuring 1.1 centimeters long and 0.6 centimeters in diameter. The lasers heated the gold so that it emitted X-rays, which squeezed a tiny diamond attached over a hole in the cylinder's outer wall. The diamond reached a pressure of 50 million atmospheres.

The X-ray assault nearly quadrupled the diamond's density. "That's a record," Smith says. "No one's compressed diamond to that extent before."

To read more, go to *National Public Radio*.

Los Angeles Times

## A BOOST FOR THE BRAIN


**Lawrence Livermore researchers will develop an implantable neural device with the ability to record and stimulate neurons within the brain to help restore memory.**

It sounds like science fiction, but a device that can be surgically installed in the brain to help form, store and recall memories is on its way.

The neuroprosthetics, developed by Lawrence Livermore scientists and collaborators, will someday be used by victims of traumatic brain injuries and other conditions to overcome memory problems.

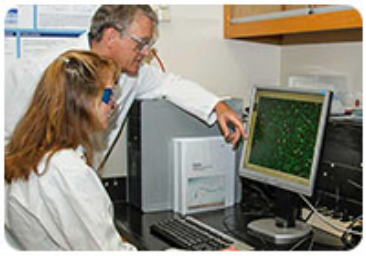
Its first beneficiaries may be wounded soldiers.

The Defense Advanced Research Projects Agency has contracted with UCLA and the University of Pennsylvania to lead a four-year effort to develop such a device. Teams of scientists from the two institutions will be aided by neural technology experts at Lawrence Livermore and by a two industrial partners Medtronic Inc. and Neuropace Inc.

To read more, go to the *Los Angeles Times*.

FOX 5 NEWS

## SCREENING FOR EMERGING VIRAL DISEASES



**Shea Gardner, a bioinformaticist at Lawrence Livermore, and Tom Slezak, the Lab's scientific leader for Bioinformatics, look over results from the Lawrence Livermore Microbial Detection Array.**

Public health authorities could soon have an aid to conduct surveillance for emerging viral diseases.

This possible use of the Lawrence Livermore Microbial Detection Array (LLMDA) was studied by an international team of researchers from eight nations in a paper published late last month in the *PLOS ONE* scientific journal.

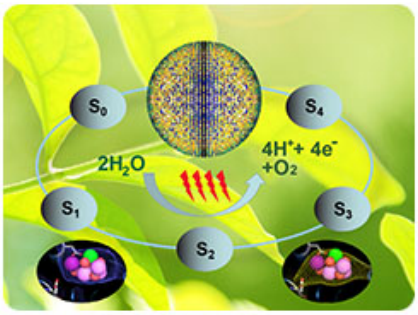
"The disease symptoms for emerging viruses are often similar to those of other more common viruses, posing a diagnostic challenge to clinicians unfamiliar with the novel organism," the authors wrote. "In the case of emerging viruses, it is crucial for patient treatment and for containment of a potential epidemic to quickly identify the correct virus."

With the use of the LLMDA, combined with a DNA amplification technique developed by researchers from Denmark, the team was able to correctly identify 29 different emerging viruses in both clinical and non-clinical samples.

To read more, go to Fox5.

ScienceDaily
Your source for the latest research news

**PHOTOSYNTHESIS' MOLECULAR MOVIE DEBUT**




**An international team recently took photos of photosynthesis in action.** ***Image courtesy of Arizona State University***

Lawrence Livermore scientists have taken the first snapshots of photosynthesis in action as it splits water into protons, electrons and oxygen, the process that maintains Earth's oxygen atmosphere.

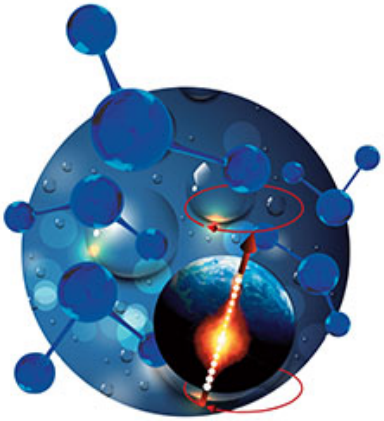
The revealing of the mechanism of this water-splitting process is essential for the development of artificial systems that mimic and surpass the efficiency of natural systems.

Photosynthesis is one of the fundamental processes of life on Earth. The early Earth contained no oxygen and was converted to the oxygen-rich atmosphere we have today 2.5 billion years ago by the "invention" of the water splitting process in Photosystem II (PSII). All higher life on Earth depends on this process for its energy needs, and PSII produces the oxygen we breathe, which ultimately keeps us alive.

LLNL scientists worked with an international consortium including Arizona State University, who led the study.

To read more, go to *Science Daily*.

ISS Source ROCK IN A HARD PLACE



**LLNL scientists have created a tool that allows scientists to probe temperatures of hydrothermal systems in the Earth's crust. Image courtesy of Greg Pautler/Graphic Design, Cambridge, Ontario, Canada.**

Measuring the extreme pressures and temperatures of hydrothermal systems in the Earth's crust is no easy feat.

However, Lawrence Livermore National Laboratory scientists, in conjunction with UC Davis, Moonash University, Johns Hopkins University and the Carnegie Institution of Washington, have made a new tool that allows them to probe pressures up to 20 kbar (20,000 Earth atmospheres of pressure).

The equation of state of the Earth's crust where water-rock interactions occur is believed to be 1,200 degrees Celsius and 60 kbars (60,000 atmospheres of pressure). Whereas earlier tools could only go up to 5 kbars (5,000 atmospheres), the new LLNL nuclear magnetic resonance (NMR) probe can measure four times more.

To read more go to *ISS Source*.

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community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send e-mail.